

Marked-Up Version of Amendments Submitted With
Request For Continued Examination

1728. (amended) The method of claim 1727, wherein the one or more heaters comprise at least two heaters, and wherein superposition of heat from at least the two heaters pyrolyzes at least some hydrocarbons within-in the part of the formation.

1729. (amended) The method of claim 1727, further comprising maintaining a temperature within-in the part of the formation within-in a pyrolysis temperature range from about 270 °C to about 400 °C.

1730. (amended) The method of claim 1727, wherein at least one of the one or more heaters comprises an electrical heaters.

1731. (amended) The method of claim 1727, wherein at least one of the one or more heaters comprises a surface burners.

1732. (amended) The method of claim 1727, wherein at least one of the one or more heaters comprises a flameless distributed combustors.

1733. (amended) The method of claim 1727, wherein at least one of the one or more heaters comprises a natural distributed combustors.

1734. (amended) The method of claim 1727, further comprising controlling a pressure and a temperature within-in at least a majority of the part of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1735. (amended) The method of claim 1727, further comprising controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day during pyrolysis within-in a pyrolysis temperature range of about 270 °C to about 400 °C.

1736. (amended) The method of claim 1727, wherein providing heat from the one or more heaters to at least the portion of the formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from the one or more heaters, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons withinin the selected volume of the formation; and

wherein heating energy/day (P_{wr}) provided to the selected volume is equal to or less than $h*V*C_v*\rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day.

1738. (amended) The method of claim 1727, wherein allowing the heat to transfer to the part of the formation heats providing heat from the one or more heaters comprises heating the part of the formation such thatto increase a thermal conductivity of at least a portion of the part of the formation is-to greater than about 0.5 W/(m °C).

1750. (amended) The method of claim 1727, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises molecular hydrogen, wherein the molecular hydrogen is greater than about 10 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure, and wherein the molecular hydrogen is less than about 80 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure.

1753. (amended) The method of claim 1727, further comprising controlling a pressure withinin at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bars absolute.

1754. (amended) The method of claim 1727, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H₂ withinin the mixture is greater than about 0.5 bar.

1755. (amended) The method of claim 1754, wherein the partial pressure of H₂ ~~withinin~~ the mixture is measured when the mixture is at a production well.

1756. (amended) The method of claim 1727, further comprising altering a pressure ~~withinin~~ the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1758. (amended) The method of claim 1727, further comprising:

providing hydrogen (H₂) to the part of the formation to hydrogenate hydrocarbons ~~withinin~~ the part of the formation; and

heating a portion of the part of the formation with heat from hydrogenation.

1760. (amended) The method of claim 1727, wherein allowing the heat to transfer ~~comprises~~ ~~increasingincreases~~ a permeability of a majority of the part of the formation to greater than about ~~100-250~~ millidarcy.

1761. (amended) The method of claim 1727, wherein allowing the heat to transfer ~~comprises~~ ~~substantially uniformly increasingincreases~~ a permeability of a majority of the part of the formation such that the permeability of the majority of the part is substantially uniform.

1766. (amended) A method of treating a hydrocarbon containing formation in situ, comprising:
providing heat from one or more heaters to at least a portion of the formation;
allowing the heat to transfer from the one or more heaters to a part of the formation;
wherein at least some hydrocarbons ~~withinin~~ the part of the formation have an initial total organic matter weight percentage of at least about 5.0%; and
producing a mixture from the formation.

1768. (amended) The method of claim 1766, further comprising maintaining a temperature ~~withinin~~ the part of the formation ~~withinin~~ a pyrolysis temperature range from about 270 °C to about 400 °C.

1769. (amended) The method of claim 1766, wherein at least one of the one or more heaters comprises an electrical heaters.

1770. (amended) The method of claim 1766, wherein at least one of the one or more heaters comprises a surface burners.

1771. (amended) The method of claim 1766, wherein at least one of the one or more heaters comprises a flameless distributed combustors.

1772. (amended) The method of claim 1766, wherein at least one of the one or more heaters comprises a natural distributed combustors.

1773. (amended) The method of claim 1766, further comprising controlling a pressure and a temperature withinin at least a majority of the part of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1774. (amended) The method of claim 1766, further comprising controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day during pyrolysis withinin a pyrolysis temperature range of about 270 °C to about 400 °C.

1775. (amended) The method of claim 1766, wherein providing heat from the one or more heaters to at least the portion of the formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from the one or more heaters, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons withinin the selected volume of the formation; and

wherein heating energy/day (P_{wr}) provided to the selected volume is equal to or less than $h*V*C_v*\rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day.

1777. (amended) The method of claim 1766, wherein allowing the heat to transfer to the part of the formation heats providing heat from the one or more heaters comprises heating the part of the

formation such that to increase a thermal conductivity of at least a portion of the part of the formation is to greater than about 0.5 W/(m °C).

1789. (amended) The method of claim 1766, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises molecular hydrogen, wherein the molecular hydrogen is greater than about 10 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure, and wherein the molecular hydrogen is less than about 80 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure.

1792. (amended) The method of claim 1766, further comprising controlling a pressure withinin at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bars absolute.

1793. (amended) The method of claim 1766, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H₂ withinin the mixture is greater than about 0.5 bar.

1794. (amended) The method of claim 1793, wherein the partial pressure of H₂ withinin the mixture is measured when the mixture is at a production well.

1795. (amended) The method of claim 1766, further comprising altering a pressure withinin the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1797. (amended) The method of claim 1766, further comprising:

providing hydrogen (H₂) to the part of the formation to hydrogenate hydrocarbons withinin the part of the formation; and

heating a portion of the part of the formation with heat from hydrogenation.

1799. (amended) The method of claim 1766, wherein allowing the heat to transfer ~~comprises~~
~~increasing~~increases a permeability of a majority of the part of the formation to greater than about
~~100-250~~ millidarcy.

1800. (amended) The method of claim 1766, wherein allowing the heat to transfer ~~comprises~~
~~substantially uniformly increasing~~increases a permeability of a majority of the part of the
formation such that the permeability of the majority of the part is substantially uniform.